

5.0 ENVIRONMENTAL CONSEQUENCES

Throughout this section the impacts focus on dredging activities within the new alignment for the S-Turn, because the impacts at the placement sites have already been evaluated in NEPA documentation for each placement site. In some sections, references to impacts at the placement sites are made if there is a specific regional concern that warrants discussion in this document.

For purposes of this evaluation, the impact area is considered to be the existing S-Turn, the proposed new channel alignment, and an area within approximately 2 miles in all directions. This includes Tolchester Beach. The area of influence for the placement sites includes the actual facility and the near-field open-water areas, approximately 1/2 mile in each direction, unless otherwise specified.

The environmental consequences of straightening the Tolchester S-Turn are determined by comparing impacts of the straightening to impacts due to continued dredging of the existing S-Turn.

5.1 PROJECT AREA

The proposed action will not change land use at the dredging or placement sites, nor significantly change the use of the area by humans. Some change in aquatic habitat in the area of the proposed realignment is expected for aquatic organisms due the change in depth. Commercial navigation activities that occur within the existing S-Turn will be relocated to the straightening area and the existing S-Turn, which will no longer be used by ships, will likely support many activities that are currently supported by the straightening area.

5.1.1 Physiography and Hydrogeology

Physiography in the area of the straightening will be altered. Site depths will increase from -23 to -28 feet to -35 to -37 feet, and the surficial sediments will be moved, exposing the soft, plastic clays that currently underlay the area. The placement sites are contained and physiographic changes occurred previously (during construction). The existing S-Turn will no longer be maintained, allowing sediments to fill in some of the area, primarily along the western edge of the channel. The new channel will be cut west of the existing S-Turn, resulting in some areas being nearly 1/2 mile farther from shore than the existing channel.

At least 7 feet of a clay confining layer will remain between the new section of the S-Turn and the nearest groundwater aquifer. This should be sufficient to continue to keep the Bay and the aquifers hydraulically separated in this area. The sediments under Poplar Island include several confining layers that are at least 35 feet thick over the nearest groundwater resources in the area which keep the Bay and Aquia Formation hydraulically separated. Although oxidation of sediments can cause acidification in dredged material placement sites, studies at HMI since 1986 have indicated that little acidification of

groundwater wells is occurring (Section 3.3.2). Because the pH of water in the wells is neutral, little migration of trace metals has been observed or is expected at HMI or would be expected at Poplar Island. This, in conjunction with the separation between the placement site and the Aquia Formation, groundwater impacts at Poplar Island are not expected.

5.1.2 Sediments

S-Turn Straightening

No significant changes in sediment composition or quality are expected in the realigned channel as a result of the proposed action. Sediment composition and quality in the vicinity of the S-Turn straightening will not be significantly impacted by dredging activities.

HMI and Poplar Island

Minor changes in sediment quality and composition are expected within the placement sites, but no significant changes are expected outside the proposed placement areas. Placement of material from the Tolchester Channel S-Turn straightening is not expected to result in significant release of contaminants to the surrounding estuarine environment or to substantially increase the background concentrations of metals or other contaminants in sediment surrounding the facilities. Studies at HMI indicate that no significant persistent chemical or physical changes have been noted in the sediment surrounding the facility (MDE 1999a and 1999b).

Based on the results of benthic community assessments, chemical analysis, toxicity testing, and bioaccumulation studies, post-placement sediment quality is expected to support biological communities (aquatic organisms and vegetation). If placed at Poplar Island, the sediments from the Tolchester straightening are proposed for placement in the upland cells and will likely be covered by subsequent placement events from other dredging projects since this would be one of the early placement operations at Poplar Island.

Because the Tolchester straightening sediments are proposed for upland or contained placement (not open water), potential water column impacts to larval bivalves due to release of chemical constituents in return water from the contained sites are not considered likely. In addition, the potential uptake of contaminants directly from the sediments to biota would be minimal because the sediments are proposed for placement in an upland cell.

Post-placement discharges from either Poplar Island or HMI will be monitored for metals and organic contaminants. Regular sediment quality, benthic community, and benthic tissue evaluations will be conducted around each facility to monitor potential changes to sediment quality and benthic communities over time and to monitor potential contaminant uptake by benthic organisms. Methodologies for the sediment quality, benthic community, and benthic tissue studies will follow the MDE-approved monitoring

plan. Previous studies at HMI have indicated that discharges from the facility have not adversely impacted sediment quality or associated benthic communities surrounding the facility (MDE 1998). Similar findings are expected at Poplar Island.

5.2 AIR QUALITY

Tolchester Channel S-Turn

The project in Kent County will result in a temporary increase in emissions from dredge diesel engine generator sets and diesel-powered tending and towing tugs. Temporary construction activities are generally accounted for in the emission budget of the Maryland State Implementation Plan (SIP). Consultation with MDE indicated that the proposed dredging project for the Tolchester Channel S-Turn project would be in compliance with the Maryland SIP (Franks 2000, personal communication).

HMI and Poplar Island

Impact assessments for these sites indicated that placement site activities would not negatively impact air quality in the area due to the relatively small outputs of the construction equipment and the intermittent nature of the placement activities. No conformity determination was necessary for either placement site.

5.3 WATER QUALITY

No significant impacts to water quality are expected at the dredging site or in the vicinity of the placement sites. A Clean Water Act Section 404(b)(1) evaluation was performed and is included in Appendix III.

S-Turn Straightening

Water quality in the upper Bay region will not be adversely impacted by dredging activities. Clamshell dredging creates some disturbance and resuspension of sediments into the water column, which is considered *de minimis*. During the dredging process, a small quantity of sediment will be resuspended near the bottom of the water column when the clamshell bucket hits the bottom, and a small quantity of sediment will be lost to the water column as the bucket is raised to the surface. The suspended sediments would soon settle to the bottom and the small volume of released material would be dispersed quickly near the dredging point by the ambient water. The chemical contaminants in the material proposed for dredging are present at low concentrations, and the actual dredging process is not expected to significantly resuspend sediments or release concentrations of dissolved constituents that will impact water column organisms or affect human health. Appropriate management practices will be implemented during the dredging process to minimize any incidental release of sediment to the water column. Barges will be filled to allow a minimum of 1 foot of freeboard inside the scow. Overflow of scows at the dredging site will be prohibited. USACE will routinely inspect the dredging site to ensure that contractors comply with these requirements.

Potential water column impacts to larval bivalves are not expected to be significant during the dredging process since releases from clamshell dredging are considered *de minimis* when compared to open water placement, which the elutriate/blue mussel bioassay test simulates, and because dredging will be done during the October through March time-frame when larval forms are not present in the area. The fact that the elutriate test is designed to identify potential effects at open-water placement sites and that it represents a concentrated mixture of dredged material and water compared to what would be expected during mechanical dredging, results in an over-estimate of the potential impact associated with the dredging operation. Overall, dispersion of sediment during the dredging operation would be rapid (yielding *de minimis* exposures), and no impact to larval bivalves would be expected within the vicinity of the dredging operations.

Hydrodynamic modeling conducted by WES indicated that the proposed Tolchester Channel S-Turn straightening would have no significant impact on tidal circulation, tidal amplitude, tidal currents, or salinity in the Chesapeake Bay.

Turbidity associated with clamshell dredging and hydraulic placement in the contained placement sites is expected to be temporary and minor. Overflow of scows during dredging of the channel and during unloading of the sediment at the placement site will be prohibited to minimize turbidity.

Investigations of nutrient releases associated with dredging activities in the upper Bay have indicated that phosphorus releases are not expected during dredging and placement activities if dredging and placement occur during late fall, winter, and spring due to low temperatures and sufficient oxygen levels in the water. Some nitrogen (ammonium) releases are expected during dredging activities, but they are expected to be short-term, and are not expected to have a significant impact.

After initial dredging is complete, some nutrients will be released from the exposed sediments within the newly dredged area. The area to be dredged will be approximately 608,320 square meters (including channel side slopes). Previous studies of the nitrogen flux rates in Bay sediments have indicated that an average flux rate of 0.03 pounds per square meter over a short time period of days or weeks (release is quicker when temperatures are warmer) after dredging can be expected for newly dredged areas. This would result in a total nitrogen release of 18,250 pounds over a short time period of days or weeks after dredging within the proposed straightening area. In contrast, maintenance dredging would result in a much lower release of nitrogen, because much less dredging would occur during each maintenance cycle (300,000 cy dredged every other year for maintenance versus 3.0 million cy dredged during the initial straightening) and the dredging area would likely be smaller (maintenance dredging is usually only required along the channel edges). Experimentation indicated that phosphorus is not released from Bay sediments at the temperatures (less than 15 degrees Celsius) and oxygen levels that occur in the upper Bay during the fall, winter, and spring dredging season (Cornwell 1999; Cornwell et al. 2000; Cornwell and Owens 1999).

Hart-Miller Island

No significant impacts to water quality are expected as a result of dredged material placement at Hart-Miller Island. The HMI site is strictly monitored for water quality by MDE and operated under a State Discharge Permit issued by MDE. A list of effluent non-compliance violations since HMI became operational in 1984 is provided in Table 3-1. No discharge permit violations have occurred that resulted in observed impacts to water quality or aquatic resources, and no violations have occurred at HMI since 1993.

Some nutrients will be released from the exposed sediments within the placement site during dewatering. Nutrients are routinely measured as part of HMI's water quality monitoring program. At the placement site, nitrogen is estimated to be released through the discharges at a rate of 0.045 pound per cubic yard of dredged material, resulting in a total nitrogen load of 135,000 pounds over the placement and dewatering period (approximately one year). Phosphorus is estimated to be released at the rate of approximately 0.001 pound per cubic yard of dredged material, resulting in total loadings of 3,000 pounds (estimated average of HMI releases 1986-1998). Similar loadings have been released from HMI since it first came on line (16 years ago) and have caused no observable impacts to the biota. After initial (new work) straightening, nutrient impacts would be much less as maintenance dredging of the straightened S-Turn is estimated to require 300,000 cy every other year as opposed to 3 million cy for the new work, and the dredging area is expected to be much smaller.

Appropriate management practices will be implemented during the placement process to minimize the incidental release of sediment to the water column. No placement of dredged material will be permitted outside of the placement sites and overflow of scows at the placement site will be prohibited at all times.

No violations are expected during the placement and dewatering of the Tolchester S-Turn sediments at HMI. The site is strictly monitored by MES and discharges are expected to comply with all MDE permits. Consequently, discharges from the operations at HMI that would result if the material from the Tolchester S-Turn straightening is placed at the site are not expected to create a significant impact on water quality or aquatic resources. MDE has concluded that no persistent chemical or physical changes have been noted in sediments or benthic communities surrounding the island. The discharge of return water from the placement site as the material is de-watered is expected to meet all MDE discharge permit limitations. Appropriate measures to minimize turbidity will be implemented. Erosion and sediment control measures will also be implemented in accordance with local, State, and Federal regulations.

Poplar Island

No significant impacts to water quality are expected as a result of dredged material placement at Poplar Island. Appropriate management practices will be implemented during the placement process to minimize the incidental release of sediment to the water column. No placement of dredged material will be permitted outside of the site and the overflow of scows at the placement site will be prohibited at all times.

Some nutrients are expected to be released from the exposed sediments within the placement site during the dewatering process. Based on historical monitoring at HMI, nitrogen is estimated to be released through the discharges from Poplar Island at a rate of 0.045 pound per cubic yard of dredged material during the placement and dewatering period (approximately one year), resulting in a total nitrogen load of 135,000 pounds (as a result of the new work placement). Based on studies conducted at HMI, ammonia levels in discharges from Poplar Island are expected to be elevated when compared to surrounding Bay waters. Ammonia levels would be expected to dissipate to background levels very quickly after discharge. Phosphorus is estimated to be released at the rate of approximately 0.001 pound per cubic yard of dredged material, resulting in total loadings of 3,000 pounds at the time of the new work placement (based on average of HMI releases from 1986-1998) from Poplar Island. Future releases of nutrients from Poplar Island are expected to decrease after the wetlands are established. After initial (new work) straightening, nutrient impacts would be much less as maintenance dredging of the straightened S-Turn involves 300,000 cy every other year as opposed to 3 million cy for the new work and the dredging area is expected to be much smaller. Nutrient analyses of discharge water and exterior water surrounding the facility will be conducted to monitor nutrient releases associated with the dewatering process. Nutrient monitoring methodologies will follow a MDE-approved monitoring plan.

Because no HMI discharge permit violations have occurred that resulted in observed impacts to water quality or aquatic resources, and no violations have occurred at HMI since 1993, no violations are expected during the placement and dewatering at Poplar Island. The site will be strictly monitored by MES and discharges are expected to comply with all MDE permits. Consequently, discharges from the operations at Poplar Island that would result if the material from the Tolchester S-Turn straightening is placed at the site are not expected to have a significant impact on water quality or aquatic resources, or increase the level of organic or inorganic contaminants above background concentrations. The discharge of return water from the placement site as the material is de-watered is expected to meet all MDE discharge permit limitations. Appropriate measures to minimize turbidity will be implemented. Erosion and sediment control measures will also be implemented in accordance with local, state, and Federal regulations. Discharges from the Poplar Island site would also be expected to meet all State Water Quality Certification requirements. The discharge would not be expected to affect the oyster bars located to the west and south of the site.

5.4 AQUATIC RESOURCES

No significant impacts to aquatic resources are expected as a result of the proposed action. The nearest SAV is over 3 miles away from the dredging site, east of Swan Point. Turbidity from dredging (both new work and maintenance) will dissipate long before it reaches these beds and no impacts are predicted. Benthos within the area to be dredged are expected to be destroyed, but recolonization is expected between dredging cycles (maintenance dredging is anticipated every other year). The benthic community is considered depauperate due to seasonal hypoxia and the pioneer species that would be

expected to recolonize the area are those that typically thrive in poor benthic habitat. No wetlands or SAV exist within the dredging area because of the existing depths. The HMI placement site, which is actively being used for material placement, does not currently support SAV or wetlands. Existing wetlands at the Poplar Island site will be protected and incorporated into the final wetland design of the site and there will be no impacts to SAV at Poplar Island. The watermen raised concerns that straightening the S-Turn will decrease current velocities in the existing S-Turn and over Hodges oyster bar, located south of the S-Turn, which may increase sedimentation on Hodges oyster bar. No significant impacts are projected to oyster bars in the vicinity of the S-Turn based on the results of hydrodynamic studies, which concluded that there would be no significant change in currents at the oyster bars. Dredging will proceed from south to north to minimize impacts to oyster beds. No impacts are projected for the oyster bars in the vicinity of Poplar Island.

Most fish spawning and early lifestage development of recreationally and commercially important finfish species in the area occur between April and mid-October. The S-Turn area, however, is not within the anadromous fish spawning area or critical nursery area of the upper Bay. It does, however, lie within the general nursery area for several species, although most finfish could not use the deeper area of the water column in warmer months due to low oxygen (hypoxia). Additionally, depths at the site would not be conducive to overwintering juvenile finfish. Juvenile crabs using this area of the turbidity maximum zone are expected to avoid the immediate dredging area during straightening and maintenance. However, some mortality may occur if smaller individuals cannot avoid the area. Potential impacts are expected to be minimized because dredging will be timed to occur when the early lifestages of most finfish are not yet in the Bay (October 1 to March 31).

Due to the depths and substrate type, the only commercial shellfish that utilize the site are blue crabs. Although watermen identified the area as one that is regularly harvested, harvesting is likely limited in warmer months due to low oxygen. Any crabs that are overwintering within the new channel alignment or are present at the time of dredging would be lost as a result of the dredging operations. Based on historic overwintering crab densities observed in the upper Bay during winter crab surveys from 1992 to the present, it is estimated that from 0 to 8700 crabs could be in the project area during initial or maintenance dredging. These would be predominantly males and juveniles. This is lower than the average range reported for similar depths in the upper Bay during this same period. On average a similar-sized area of the upper Bay within this depth range (less than 40 feet) would contain 1200 to 9600 crabs in any year.

MDNR has asked that dredging for this project be conducted between October 1 and March 31 to be protective of potential anadromous fish spawning and nursery life stages and to avoid commercial and recreational fishing that is popular in and adjacent to the site. Letters from charterboat captains indicate that some recreational fishing still occurs inside that window (until November 30). Work on this project, if approved, is likely to begin in October 2001. Finfish and fall and spring fishing activity in the straightening area could be displaced during the October to March dredging. It is anticipated that in

subsequent years, fishing will be displaced to other areas with no significant impact to finfish and minimal loss to fishing activity.

The HMI Exterior Monitoring TRC reported to MPA in January 2000 that, based on annual monitoring performed for 16 years at HMI, no significant impact to the benthic community or to benthic populations was observed. Poplar Island is not expected to have a significant impact to the aquatic resources in proximity to the placement site. Benthic populations in the vicinity of Poplar Island will be monitored before, during, and after placement activities.

Watermen raised concerns that realigning the channel will alter currents and increase sediment deposition on Hodges Bar (immediately south of the existing S-Turn area). WES modeled the potential for this impact and determined that currents will change less than 0.1 fps over the Bar, which is not expected to significantly affect this resource because it is a very small change over existing conditions. Field measurements of currents during April and May 2000 confirmed the baseline conditions used for the modeling effort. In addition, a post-project current monitoring study will be conducted to confirm that currents are within the predicted ranges.

Essential Fish Habitat

Coordination with NMFS on EFH in the project and placement areas indicated that the existing Tolchester S-Turn, proposed straightening area, and placement sites lie within the general reach of EFH for bluefish, winter flounder, and summer flounder. However, the placement sites are fully contained and would not impact EFH. No impacts to spawning, egg, or larvae habitat of the bluefish are projected because spawning does not occur in the Chesapeake Bay, and the eggs and larvae are not present in the straightening area or either of the alternative placement sites. Impacts will be avoided in the Tolchester straightening area because during most of the dredging window, adult and juvenile bluefish would be overwintering off of the southeastern coast of Florida. Bluefish do not begin their migration into the upper Chesapeake Bay until May in most years. Adults are not typically bottom feeders and are strong swimmers that can easily avoid disturbances caused by dredging operations. Juveniles prefer shallower waters and probably do not use the dredging site.

Adult summer flounder would not likely be near the proposed project area during the dredging window because they overwinter in the ocean. Larvae and juveniles migrate into the Bay in October, but prefer shallower waters and are not likely to be present near the straightening area due to the existing depth. No impacts to spawning or summer flounder eggs are projected because spawning occurs during the offshore ocean migration, which is not located in the Chesapeake Bay, and the eggs are not present in the vicinity of the proposed project.

Winter flounder adults and juveniles are in the Bay during the time of the year (winter) within deep areas of the Bay that contain enough dissolved oxygen to support a benthic community. Juveniles and adults are mobile and should be able to avoid most dredging

activities proposed for the straightening area. Some food sources (benthics) will be lost during dredging. However, deeper areas like the proposed project area are not considered to be a significant food resource for the winter flounder because of the annual depression of benthic species due to yearly hypoxia and anoxia.

The critical life stages of winter flounder are in the Bay during the placement window because spawning takes place from mid-February to mid-March in shallow waters (less than 12 feet). Known winter flounder spawning areas include the Patapsco, Sassafra, and Chester Rivers. The nearest of these is the Chester River, which is more than 5 miles from the straightening area. They are not expected to utilize the straightening area due to the depths (greater than 20 feet). Winter flounder eggs stick to the bottom and are not transported out of the shallows. The winter flounder larvae are strongly attracted to the bottom (demersal) so it is unlikely that they would drift far from the spawning areas. Larvae that are transported to the dredging area may survive if they are not removed by the dredging process. However, the amount of larvae that would likely be present in the straightening area is negligible.

The removal of benthic macroinvertebrates temporarily reduces the size of the benthic population available for consumption by finfish. This may impact benthic-feeding finfish populations such as winter flounder that may use these areas as feeding grounds in the winter and spring. While most fish experience reduced metabolism and reduced need for food in the winter, the loss of benthic organisms could result in fish moving to nearby unimpacted areas to feed and possible increased competition for benthic food resources in other areas. Due to the relatively small area to be impacted by the dredging (approximately 608,300 square meters, including channel side slopes), this is expected to be minimal.

Bluefish are voracious predators. They are sight feeders throughout the water column, with smaller individuals feeding on a wide variety of fishes and invertebrates and with large bluefish feeding almost exclusively on fishes, particularly Atlantic menhaden, bay anchovies, and Atlantic silversides. Minimal impacts to bluefish prey (such as bay anchovy, menhaden, and Atlantic silversides) are anticipated in the proposed project area. Some of the young of these species are found predominantly in depths less than approximately 25 feet and most would not be present during the proposed dredging window of October 1 through March 31. This would include the area to be straightened.

In general, finfish and sensitive spawning periods are not expected to be affected by elevated turbidity in the water column or by nutrient releases from the bottom sediments from the proposed project. Finfish in the Bay are generally used to and tolerant of turbid water quality. The area of the upper Bay in the vicinity of the S-Turn is considered to be in the turbidity maximum of the Bay. It is expected that finfish in the vicinity of the straightening area will avoid the immediate area during dredging. In addition, placement will be contained; therefore, no significant placement impacts are predicted. It is expected that demersal (bottom-dwelling) species potentially would be impacted more by the proposed project than pelagic (water-column) species, but both are expected to leave the immediate area during dredging.

5.5 VEGETATION

The proposed action will not result in significant impacts to vegetation since the placement sites are currently diked areas and do not contain mature or native vegetation, with the exception of a small amount of wetlands inside Poplar Island, which will be preserved. The use of the site is not expected to have a significant impact on vegetation at Hart-Miller Island State Park or on the proposed environmental restoration of the HMI South Cell. The USACE permit requires that, "The State of Maryland in consultation with local and Federal agencies shall develop and implement a comprehensive plan for open space, fishing, wildlife and recreational use of Hart Miller Islands, and land created from the deposit of spoil within the containment area and as part of the open space concept, productive marshes shall be included within the project area." Planning and engineering activities are underway for the South Cell and construction is scheduled to start in Fall 2001. Similar development will be performed for the north cell of HMI when it is fully utilized. Poplar Island was designed to provide more than 500 acres of wetlands and 500 acres of uplands habitat when completed. Currently the Poplar Island cells only support minimal vegetation on the remnant islands. However, the current restoration plans call for planting high and low marsh plants in the 500-acre wetland cells that will be fed by a series of tidal creeks. The upland areas will be planted with native trees and shrubs to provide upland habitat similar to that available on nearby Coaches Island.

5.6 WILDLIFE RESOURCES

Wintering waterfowl use of the proposed channel is minimal. Waterfowl that may raft there would be temporarily displaced while dredging occurs and the barges transit to and from the placement area. Some waterfowl will be displaced from the Poplar Island area during placement operations. This disturbance is expected to be insignificant and waterfowl are expected to return after the barges pass. Birds utilizing the placement sites could be temporarily displaced during the intermittent filling activities but will return after filling activities cease. Any adverse impacts to wildlife resources in the dredging and placement area will be temporary. In the longer-term, a positive impact is expected when birds are attracted to the ponds created at the placement site after material placement. Also, Poplar Island and parts of the south cell of HMI will be developed into wetlands and mudflats which will provide wildlife habitat.

5.7 RARE, THREATENED, AND ENDANGERED SPECIES

In letters dated July 9, 1996 and July 8, 1996, respectively, USFWS and the State of Maryland indicated that the proposed action will not adversely impact any Rare, Threatened, or Endangered species (Appendix I). By letter dated December 16, 1997, NMFS indicated that USACE, Baltimore District should prepare a Biological Assessment (BA) for shortnose sturgeon (SNS). Baltimore District prepared an interim BA that includes a more thorough evaluation of dredging activities and dredged material placement alternatives in the upper Chesapeake Bay, including this project. The review

of the interim BA is ongoing (NMFS letter dated December 20, 2000, Appendix I). A final BA will be prepared following completion of the field studies.

Few studies have been conducted on dredging and placement related impacts to SNS. However, potential impacts that could occur from dredging include (1) physical injury or death to sturgeon due to entrainment by a hydraulic pipeline or hopper dredges; (2) injury to larvae or juveniles from dredging operations; (3) the disruption of migrations due to physical disturbances and noise; (4) the settling of suspended material on the spawning ground or foraging locations; and (5) if the material is contaminated, toxin uptake by sturgeon. Hastings (1983) suggests that dredging in some river systems produces a residual beneficial impact on sturgeon by creating or maintaining deeper channel regions which both juveniles and adults seem to prefer.

During other projects it has been determined that maintenance dredging of Federal navigation channels can potentially adversely affect or jeopardize SNS. In particular, hopper dredges and hydraulic dredges can lethally harm sturgeon by entraining fish up through dredge dragarms, suction pipelines, and impeller pumps. In addition to the direct effects of dredging operations, SNS may be potentially impacted by the destruction of benthic feeding areas, disruption of spawning migrations, and deposition of resuspended fine sediments in spawning habitat as a result of dredge operations. Potential impacts from hydraulic dredge operations may be avoided by imposing work restrictions during sensitive time periods (i.e., spawning, migration, feeding) when sturgeon are most vulnerable to mortalities from dredging activity. To avoid jeopardy to the critical life stages in other river systems from projects in the past, NMFS has recommended that USACE use alternative dredge types (i.e., clamshell and hydraulic pipeline) and/or reschedule the project after sturgeon were likely to have moved away from the project area (USACE 1997a). The work will be performed utilizing a mechanical (clamshell) dredge.

Recent studies of SNS in the Bay have indicated that, based on the distribution and timing of capture data, it is possible that SNS spawn in the Potomac River and below the Conowingo Dam in the Susquehanna River. Based on these observations, impacts of dredging and siltation on spawning areas or early young would not occur because SNS spawning areas would be found much further upstream in freshwater areas. In addition, the sampling conducted by USFWS and USACE from 1997 to Spring 2000 has yielded no SNS in more than 170, 318, and 459 hours of gill-netting immediately south and west of the straightening area and in the southern and northern sections of the Tolchester Channel, respectively. One SNS was captured in December 2000 in a net south of the Tolchester area, but was the only such capture in the vicinity of the proposed project during the reward program (1996-2000).

Another potential impact is disruption of SNS overwintering habitats. However, according to NMFS, review of the most current information on and tracking studies of SNS, overwintering habitat of SNS is likely to be between Howell and Grove Points, which is more than 10 miles north of the site. Therefore, no impact to SNS overwintering habitat is predicted.

5.8 FLOODPLAINS

Both of the proposed placement areas are located in the 100-year floodplain. Pursuant to Executive Order 11988 (Floodplain Management), these areas have been determined to be the most practicable alternatives at this time, and impact on the natural and beneficial values of the floodplain are expected to be minimal. The dredging site is not within a floodplain.

5.9 PRIME AND UNIQUE FARMLANDS

There are no prime or unique farmlands in the straightening area or at either of the placement sites, so there will be no impacts to this resource.

5.10 WILD AND SCENIC RIVERS

There are no wild or scenic rivers in the straightening area or at either of the placement sites, so there will be no impacts to this resource.

5.11 CULTURAL RESOURCES

The Maryland Historical Trust (MHT) indicated in its June 27, 1996 letter that the proposed project will have an insignificant threat to submerged cultural resources. Although a March 2000 letter indicated that USACE needed to allow time for marine archaeological investigations of the area, previous Phase I and Phase II investigations for the C&D Canal Deepening have determined that there will be no impacts to cultural resources at the Tolchester S-Turn straightening site. The placement sites are existing dredged material placement facilities and have previously undergone a Section 106 coordination with a no effect determination. An April 5, 2001 letter concurred with this conclusion (Appendix I).

5.12 HAZARDOUS, TOXIC, AND RADIOACTIVE SUBSTANCES

The proposed project is not expected to result in the use or production of hazardous materials. No hazardous, toxic, or radioactive substances (HTRS) sites are within the vicinity of the Poplar Island or HMI placement sites. A formerly used Nike missile site exists approximately 3,000 feet inland from the shoreline in the vicinity of Tolchester Beach. Sediments to be dredged from the proposed realignment of the Tolchester Channel S-Turn, as well as from the existing Tolchester Channel, do not indicate the presence of HTRS, and it is unlikely that contamination from the Nike site has accumulated to any significant extent in the channel. A contract to perform an initial two-year period of groundwater sampling and laboratory analysis at the former launch facility was awarded on September 29, 2000. A contract to remove nine underground storage tanks (three in the Launch Area and six in the Control Area) was awarded on September 30, 2000. Fieldwork to remove these tanks was completed on 6 December 2000. All contaminated soil identified during the tank excavation was also removed from the site. No contaminated soil remains at the former tank locations. Formal acceptance

of the tank closure report by MDE is pending. Additionally, closure of six underground missile silos (all located in the Launch Area) is programmed for FY 2002; however, execution of this project is subject to availability of funding.

Therefore, the Nike site is not considered to have had or expected to have any impact to the proposed dredging or placement, nor is the proposed dredging expected to impact any remediation or other activities at the Nike site.

5.13 INFRASTRUCTURE

The proposed project will require the use of clamshell dredges, tugs, scows, and crew boats that will use the shipping channels. It will also require the use of hydraulic unloader, vehicles, and equipment to place the material. Project activities will be short-term and are not expected to significantly impact existing transportation routes such as shipping channels. There will be minimal impact on ship traffic during construction because ships will continue to use the existing S-Turn until the new straightened channel is ready. There will be a slight increase in crew boat traffic between the dredges and the shore point selected by the contractor to transfer crews between land and the dredges, and between the placement site and shore point selected to transfer crews between the shore and placement site.

The proposed straightening will be accomplished in a manner which minimizes any impact on vessel traffic. Baltimore District works closely with MPA, the Association of Maryland Pilots (AMP), U.S. Coast Guard (USCG), and dredging contractors to minimize disruption of ship traffic during dredging projects. MPA, AMP, and USCG are consulted prior to preparation of the plans and specifications to include necessary conditions for performing the work. Contract specifications for dredging contractors require them to minimize obstructions to navigation and to move their equipment to provide safe passage of vessels. The new channel will be cut west of the existing S-Turn,.

Since the proposed work is to construct a new channel, the contractor's dredging equipment will be positioned outside of, not within, the existing Tolchester Channel S-Turn. Tugs pushing scows between the dredging and placement sites will avoid interfering with commercial shipping. Some recreational and commercial (fishing/crabbing) boat activity may be displaced during dredging.

There could be an increase in vehicle traffic on some Kent County roads if the dredging contractor decides to make crew runs from a Kent County shore point to the dredges. There will be a minimal increase in vehicle traffic on Route 33 in Talbot County as workers travel to and from the Poplar Island work site.

5.14 SOCIOECONOMIC CONDITIONS

5.14.1 Demographics

The project is not expected to alter the population or demographics of the counties surrounding the project area or either of the placement options.

5.14.2 Employment/Industry

The largest benefit of the project will be navigation safety and efficiency. The improvements to the channel will improve ship passage and decrease transit time from the northern approaches to the harbor due to the slightly shorter travel distance. Short-term and temporary increase in employment is expected to perform the dredging and placement operations. There will also be short-term, minimal increases in some service industries such as restaurants, hotels, service stations, convenience stores, and marine supply stores in the vicinity of the shore points used to transfer crews to the dredging and placement sites.

According to the demographics, fishing comprises a very low percentage of employment in the upper Bay region. Therefore, any impacts to commercial fishing will likely only have a small impact on regional employment. The potential for impacts of the realignment to the adjacent natural oyster bar is discussed in Section 5.4. The placement sites are not commercially harvested and any commercial harvesting that is done in the proximity of the sites will be minimally affected by this action. The extent to which the existing S-Turn and proposed realignment are commercially harvested is unknown. Crabbing and commercial fishing reportedly occur within the straightening area but this is most probably during cooler months due to summer hypoxia at depth. Any current harvesting activities in the proposed straightening area would be permanently displaced, but may be offset by increased crabbing and fishing activity in the existing S-Turn, which will no longer be used by commercial vessels. One other potential impact is on fishing gear. Any gear that is set in the water in or adjacent to the straightening area during construction could potentially be lost by being run over by tugs, barges, or crew boats. It is expected that this will be minimal because little crabbing is done during winter, no fixed gear (pound nets) are used within the straightening area, and gill-netting would be predominantly drifted (fixed to the fishing boat). Also, the affected area is very small relative to the available areas of like-habitat/fishing areas in the upper Bay. Therefore, impacts to employment and income are not expected to be significant.

5.14.3 Schools, Libraries

The project is not expected to affect these resources.

5.14.4 Noise

The noise in the existing Tolchester Channel S-Turn is predominantly generated by ships, tugs, and other commercial and recreational vessels using the channel, and is considered

minor. In the short-term, there will be an increase in dredge, tug, crew boat, and barge activity during dredging of the straightened section. This is expected to occur over one dredging season (winter-spring) and is expected to be a minor increase over present noise levels experienced by the residents along Tolchester Beach. In the longer term, straightening of the Tolchester Channel S-Turn would move some parts of the channel approximately 1/2 mile farther from shore, which is expected to slightly reduce the noise reaching land. Because both placement options are existing facilities, a certain amount of noise already occurs at the sites. This project is not expected to increase noise levels above those of normal placement activities.

5.14.5 Aesthetic Resources

The visual experience in the project area is a combination of the activities of a typical commercial/industrial port and the natural beauty of the Chesapeake Bay. Many container vessels, tankers, bulk carriers, general cargo vessels, and smaller commercial and recreational vessels move around the harbor and channels areas. Dredging will result in more equipment in the area that may be displeasing to some viewers from the shore and other vessels for a short time. Temporary impacts to aesthetics are expected at HMI or Poplar Island due to increased equipment such as the unloader, tugs, barges, crew boats, and construction equipment associated with the placement activities.

5.14.6 Recreation Resources

Dredging and placement activities are expected to interfere minimally with recreational boating activities because the work will be conducted primarily during the late fall and winter, when recreational boating on the Bay is at a minimum. Any increased shipping activity that may occur due to straightening is not expected to conflict with recreational activity because the two activities currently coexist in the area. In addition, preliminary results of boating activity studies in the upper Bay seem to indicate the Tolchester area has among the lowest boat utilization of all specific areas counted so far. The S-Turn area contained 1.7% or less of all the upper Bay boating activity (in early summer) on any sampling day thus far (Section 4.4).

Residents are concerned that straightening the channel will increase ship traffic and will allow vessels to increase speeds, which may increase wave action at Tolchester Beach and the adjacent marina. This increased wave action could be hazardous to recreational boating and swimming in the area, and could potentially damage personal property along the shore. This is of particular concern because a child drowned in the area in 1986, reportedly due to high wave action from a passing ship, and residents have indicated that ship wakes have caused damage to property on shore. The Association of Maryland Pilots is acutely aware of the safety concerns with vessel speeds and ship wakes in the area and does not anticipate increasing vessel speeds in the area. In addition, some areas of the new channel will be approximately 1/2 mile farther from shore, which should decrease the near-shore waves. The proposed action will, therefore, not increase the risks of public, child, or property safety.

The AMP is sensitive to the concerns for recreational safety in the area. In a letter dated September 26, 2000 (Appendix I), the Pilots Association acknowledges the public concern of increased boat speeds and states that they will continue to navigate ships at the current speed in order to be safe. They also believe that moving the channel further from shore will allow for a greater distance for waves to dissipate.

5.15 ENVIRONMENTAL JUSTICE

Since no minority or low-income communities are located in or dependent upon the straightening area or either placement site, this project is not expected to adversely impact these communities (in accordance with Executive Order 12898, dated February 11, 1994). The project will not disproportionately favor any economic class of people in the study area.

5.16 SAFETY TO CHILDREN

Activities associated with the dredging for the proposed straightening and placement of the dredged material are not expected to impact the health or safety of children since children will be prohibited from getting near the dredging and placement activities. The project does not involve hazardous substances or other toxicants that would pose a risk to children. On June 21, 1986, a 7-year-old child drowned reportedly due to being drawn off the shore by ship-induced Bay waves. Vessel wakes in the area are of particular concern to child safety. The AMP is aware of the concern over increased vessel speeds and the resulting wave/current hazards on beaches or jetties along Tolchester Beach and has indicated that vessel speeds and wave action are not expected to increase. Moving the channel further from shore may decrease the risks. The dredging and placement sites will not be accessible to children. Therefore, no increased risk to children is anticipated.

5.17 NAVIGATION

Straightening of the Tolchester Channel S-Turn will eliminate four turns and provide a straight channel reach from the Brewerton Channel Eastern Extension to Tolchester Beach, thereby improving navigation safety and shortening the channel length by approximately $\frac{1}{4}$ mile. Vessels will only be required to make a single course change in lieu of three to five course changes in the vicinity of Tolchester Beach. Improving navigation safety will reduce the risks of accidents and groundings, thereby reducing the risks of potential environmental damage resulting from the groundings. Pilots will be able to use the new range lights for the entire reach of the channel from Tolchester Beach to the Brewerton Channel Eastern Extension. The U.S. Coast Guard indicates that it will be able to achieve some cost savings by eliminating two floating aids to navigation as a result of realigning the channel. No significant impacts are expected to existing navigation during dredging of the new channel since the dredging equipment will be located outside of the existing channel. Therefore, significant positive impacts are expected to accrue to navigation as a result of straightening the Tolchester Channel S-Turn. No adverse impacts to navigation are anticipated.

5.18 IRRETRIEVABLE COMMITMENT OF RESOURCES

The use of Poplar Island or HMI as a dredged material placement site for the straightening of the Tolchester Channel S-Turn is an irretrievable commitment of resources because there are a limited number of sites that are available to accept dredged material. This is particularly true of HMI because it is currently the only site that can accept contaminated materials and sediments from Baltimore Harbor. State law requires any sediment dredged west of a line drawn across the mouth of the Patapsco River, from Rock Point to North Point, to be placed in a contained site. Three mcy of the estimated 40-mcy of placement capacity at Poplar Island will be utilized for this effort. The impact of the use of this capacity at Poplar Island is equivalent to approximately one year of maintenance dredging of the Maryland portion of the Baltimore Harbor & Channels project, which is not expected to be significant over the long term. Straightening the S-Turn is included in the State's Strategic Plan for Dredged Material Management and the District's Dredged Material Management Plan. The water depths and the bottom conditions at the Tolchester S-Turn are not scarce in the Bay or unique in terms of usage by natural resources.

5.19 CUMULATIVE IMPACTS

The proposed project is not expected to contribute significant adverse cumulative impacts in the area. It will improve navigation safety and efficiency (due to the shortening of the channel) and reduce future maintenance dredging requirements.

Other dredging projects will be ongoing in the upper Bay around the time that the S-Turn is proposed for straightening (fall 2001 to spring 2002). Annual maintenance dredging is also scheduled for this time period. In addition, Poplar Island Phase II construction will be nearing completion in the fall 2001. Because Poplar Island is nearly 40 miles away from the straightening area, short-term impacts from the Poplar Island project are not expected to be cumulative with potential impacts for the S-Turn straightening. With these projects ongoing within one dredging season, some temporary cumulative effects to various resources may occur. Recreational and commercial fishing and boating in the area may be disrupted temporarily in the dredging areas.

No significant adverse cumulative impacts are expected to result from turbidity, nutrient releases, or destruction of existing benthos caused by the Tolchester Channel S-Turn initial dredging or future maintenance dredging and dredged material placement. While initial dredging involves three million cubic yards of dredged material, it will occur during only one dredging season for a period of approximately 4 to 5 months. The straightened S-Turn will be approximately 0.25 mile shorter than the existing S-Turn and will be the same depth (-35 ft. MLLW) and width (600 ft.) as the Tolchester Channel. The proposed straightening of the channel would decrease the shoaling in the channel by approximately 43,000 cy per year compared to the existing Tolchester Channel S-Turn and, therefore, decrease future maintenance dredging volumes. Maintenance dredging would be expected to occur every other year and at the same frequency as the existing S-Turn if adequate funding is available. The existing S-Turn would no longer be dredged.

There is a potential for slight stimulation of algal growth due to the timing of the straightening (October 1 through March 31), but this is not expected to be significant.

There will likely be a net decrease in fishing and crabbing activities formerly associated with the area to be dredged for the new straightened channel, because of increases in water depths and vessel traffic. Some of this fishing activity could be relocated to the existing S-Turn because it will no longer be dredged or used for commercial navigation.

No significant adverse impacts to existing infrastructure are expected. The project would improve channels serving the Port of Baltimore. However, the use of HMI would reduce the availability of that site for use in other dredging projects. Since HMI is the only placement site currently available for contaminated material from Baltimore Harbor, this type of placement capacity will be lost. However, the material from the initial straightening of the channel is currently planned for placement at Poplar Island. The use of Poplar Island or HMI for placement of material dredged from the Tolchester Channel S-Turn initial dredging, and other projects, will result in shortening the time until new dredged material placement sites are needed. In addition, initial dredging for all new work projects and maintenance dredging of those new projects where shoaling increases, will cumulatively increase the requirements for future dredging and dredged material placement capacity. This will increase future environmental impacts due to dredging and dredged material placement. The proposed new work dredging of the Baltimore Harbor Anchorages and Channels project and Brewerton Channel Eastern Extension will require the dredging of 4 and 2.5 mcy, respectively. Neither project is expected to significantly increase the amount of maintenance dredging performed annually. The magnitude of impacts from other potential new work dredging projects is currently unknown. Any future new work dredging and construction and use of new placement sites will require the preparation of appropriate environmental documentation to evaluate potential impacts.

5.20 ENVIRONMENTAL PERMITS AND REGULATORY COMPLIANCE

In accordance with Section 404 of the Clean Water Act, a 404(b)(1) evaluation was conducted to assess impacts of the proposed actions to waters of the United States (Appendix III). The State of Maryland will evaluate the project for issuance of a water quality certification and compliance with the Coastal Zone Management Act. A summary of compliance of the project with applicable environmental statutes is given in Appendix IV.